

# **GARMENT AND GARMENT ACCESSORIES HAVING LUMINESCENT ACCENTS AND FABRICATION METHOD THEREFOR**

## **FIELD OF THE INVENTION**

The present invention broadly relates to clothing garments of a type to be worn as an outer covering for the body. More particularly, though, the present invention is directed to garments, which includes garment accessories, that have lighted accents, and method for fabricating such garments. Specifically, the present invention relates to such garments which have luminescent accents that are used as costumes along with a fabrication method for such garments.

## **BACKGROUND OF THE INVENTION**

Clothing has been employed by virtually every culture since the beginning of recorded time. Clothing has been used to protect against the elements as well as to exhibit modesty of the human form. The use of clothing has even extended to the dressing of animals both as a protection against the elements and as a decoration. Often, clothing is supplemented by various accessory items.

In addition to using clothing to protect against the elements and for modesty purposes, clothing has been employed as a costume for entertainment purposes. One such example, of course, is the use of costumes in the entertainment industry, especially in the performing arts. Costumes, however, are used by many people for festive occasions. Numerous holiday events are celebrated with parties where the participants are dressed up in costumes as an enhancement to the festive spirit.

Perhaps the most widespread use of costumes occurs around the holiday of Halloween. Halloween celebrations traditionally include the use of costumes and make-up to alter a person's appearance. Here, both adults and children dress in fanciful costumes to attend parties celebrating the event. Children also dress in fanciful costumes and travel house-to-house requesting treats in the form of

handouts from the respective residents or, in the alternative, playing generally harmless pranks on the homeowner. Since the Halloween holiday has its roots on the celebration of the dead or in the celebration of saints, many costumes are designed with a pseudo-scary theme including costumes representing ghosts, goblins, witches or other phantasms. In addition, some costumes may be directed to cartoon or other fanciful creatures or beings, such as alien creatures, of a more humorous nature. There is, accordingly, a continued desire for novel appearing costumes and accessories for those costumes. There is a continued desire to create new visual appearances. The present invention is directed to meeting this need.

In addition, with respect to Halloween costumes such as those worn by children, the present invention is also directed to meeting the need for additional safety. In celebrating the Halloween holiday, when children go house-to-house requesting treats, this activity usually occurs at night. Such children are susceptible to greater risks, such as traffic, since they are generally excited and may be less prone to safety. For this reason, children carry flashlights or other light emitting objects so that they may be more visible to others. It is known, in this regard, to also use costumes that have reflective panels so as to increase the safety of the children. The present invention provides luminescent wires on a costume also to accommodate this safety concern.

### **SUMMARY OF THE INVENTION**

It is an object of the present invention to provide new and useful garments and garment accessories which may be worn or carried by humans or animals.

It is another object of the present invention to provide garments with portions that emit light so as to increase the decorative features and/or visibility of such garments and garment accessories.

A further object of the present invention is to provide garments and garment accessories with electro-luminescent wires as well as a method for incorporating such wires into the structure of these garments and garment accessories so as to provide accents for the garments and garment accessories.

Still a further object of the present invention is to provide fabrication methods for garments so as to have light emitting accents thereon.

According to the present invention, then, a garment is adapted to be worn and includes light emitting accents that are visible to an observer. Broadly, the garment of the present invention includes a garment body that has a length of piping supported on the garment body. The piping is constructed as a sleeve of mesh material of a selected mesh size so as to have a sidewall formed by loosely woven strands and with the sleeve having an open interior. In any case, a length of flexible cable is then received in the interior of the sleeve. Here, the cable is of a type that can emit visible light therefrom. A power source is supported by the garment and is operative when in an active state to cause the length of cable to emit light such that light can pass through the piping thereby to be visible to an observer.

In the embodiments shown, the strands of the piping form mesh openings with the mesh openings being about 1/16" x 1/16" (1.6 mm x 1.6 mm). The piping of the present invention can form a frame around a portion of the garment body. Further, the garment body may include a light reflecting portion, and the piping and the cable is then disposed adjacent to the light reflected portion.

In another embodiment, the piping itself can form a design feature on the garment. In still another embodiment, the garment body can have an independent decorative element formed thereon and the piping can be associated with the decorative element so as to cooperate with the decorative element thereby to form a

decorative design. Here, the decorative element can also be formed by a piece of fabric material. Indeed, according to further embodiment of the present invention, the piping itself can be a portion of the garment body. For example, the garment body can include a frame portion formed of a stiff wire. Here, the piping can extend coextensively with the wire and be supported thereby.

The length of flexible cable that is received in the length of piping can, for example, be an electro-luminescent wire that produces light in response to an applied electric current. In any event, it is preferred that the cable, such as the electro-luminescent wire be formed of a substantially non-toxic material. Where the cable is an electro-luminescent wire, the power source is operative to produce an electric current and the power source is, of course, in electrical communication with the electro-luminescent wire. The power source may produce an alternating electric current and, here, the power source may be a battery operated inverter. The power source is shown to be supported by the garment body. For example, a pouch may be secured to the garment body with the pouch sized and adapted to receive and support the power source.

The present invention further contemplates a method of forming a garment utilizing any of the structural features noted above. Particularly, this method provides a garment that has light emitting accents. Broadly the method includes a step of affixing a piping to a portion of the garment as a sleeve having an interior wherein said piping has a sidewall formed by loosely woven strands. The broad method includes the steps of placing a length of flexible cable in the interior of the sleeve wherein the cable is of a type that can emit visible light therefrom and causing the cable to emit light.

In this method, the piping can be affixed to said garment by sewing said piping at a seam between two garment portions. If desired, the piping is affixed to said garment along with an associated independent decorative element adjacent thereto. In this method, too, the cable is an electro-luminescent wire and the step of causing said cable to emit light is accomplished by applying an electric current to said wire. The piping can be selected to have a mesh size with mesh openings of about 1/16<sup>th</sup> inch by 1/16<sup>th</sup> inch (1.6 mm by 1.6 mm), if desired.

These and other objects of the present invention will become more readily appreciated and understood from a consideration of the following detailed description of the exemplary embodiments of the present invention when taken together with the accompanying drawings, in which:

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a perspective view of a child wearing a garment in the form of a costume according to a first exemplary embodiment of the present invention;

Figure 2 is a front view in elevation of the hood portion of the costume shown in Figure 1;

Figure 3 is a cross-sectional view taken about lines 3-3 of Figure 2;

Figure 4 is an enlarged view of the piping seam and electro-luminescent wire according to the present invention;

Figure 5 is a cross-sectional view taken about lines 5-5 of Figure 4;

Figure 6 is a side-view partially broken away of the hood shown in Figures 1 and 2;

Figure 7 is a front view in elevation of a second garment in the form of a costume according to a second embodiment of the present invention;

Figure 8 is a side-view in elevation of the costume shown in Figure 7;

Figure 9 is an enlarged view of the power source used with the garment shown in Figures 7 and 8;

Figure 10 is perspective view of a garment accessory according to the present invention;

Figure 11 is a front view in elevation of a portion of yet another garment according to the present invention; and

Figure 12 is a rear view in elevation showing a costume accessory that is again according to the present invention.

### **DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS**

The present invention broadly concerns clothing of the type that is adapted to be worn by humans or animals. This invention is particularly adapted for use in costume designs, although it should be understood that the scope of this invention is not restricted to costumes or accessories for costumes. Indeed, the present invention can relate to enhancing the appearance of any garment or garment accessory using electro-luminescent wires. Accordingly, as is used herein, the term "garment" includes both a traditional garment, such as clothing, as well as a garment accessory.

An important aspect of the present invention, as described below, is the use of a luminescent wire that is powered by a suitable power source. While the present invention is described with respect to an enabling embodiment of such a wire, it should be understood that other light emitting strands of any type currently known or hereinafter developed is intended to be encompassed by the scope of this disclosure and within the scope of this invention.

By way of introduction of the present invention, reference is first made to Figure 1 wherein it may be seen that a child is wearing a garment 10 in the form of

costume that includes garment body portions such as a slip over robe 12 and a hood 14. Hood 14 includes a shroud 16 and a face panel 18 and, together with robe 12, loosely simulates the appearance of an alien. Hood 14 is shown in greater detail in Figures 2, 3 and 6. Here, it may be seen that shroud 16 includes a head covering 20 and a skirt 22 which are joined together around a seam line 24. Head covering 20 and skirt 22 are formed of any suitable flexible cloth which, if desired, may be a stretchy, resilient material. Head covering 20 has a front margin that is surrounded by a stuffed pleat 26 which has opposite ends 28 and 30 that are proximate to seam 24 and extends in a close looped oval around face panel 18. Face panel 18 has its perimeter joined in a seam 32 to pleat 26 and head covering 20.

A length of piping 34 is also joined at seam 32 and extends around face panel 18. Piping 34 carries an electro-luminescent wire 36 that, as described below, may be powered to emit visible light of a selected color. The structure of piping 34, however, is best shown in Figures 4 and 5 where it may be seen that piping 34 is constructed as a sleeve 38 of loosely woven strands 40. Sleeve 38 is constructed as a strip of material having margins 42 and 44 joined by stitching 46 to create an enclosed structure having an open interior 48 that is separated from the exterior by means of a surrounding sidewall 50. Sidewall 50 is formed of the mesh material that creates sleeve 38, and, in this embodiment, this material is a 100% polyester netting having mesh openings approximately 1/16 inch by 1/16 inch (1.6mm by 1.6mm). It should be understood, however, that other materials are suitable for this purpose, whether such sizes are larger or smaller. In any event, it is contemplated that the material be strong enough to support the electro-luminescent wire, be substantial enough to contour the wire in the desired configuration and yet be open enough in mesh size to allow the wire to be readily viewed. Smaller mesh size would be

desirable if the user wanted a muted or diffused appearance to be obtained for the emitted light.

The electro-luminescent wire 36, in this embodiment, is chosen to be a flexible linear light emitting wire such as that sold under the trademark LyTec™ by ELAM Electro-Luminescent Industries Ltd. Jerusalem 91450, Israel. This electro-luminescent wire is, in essence, a light emitting capacitor formed by a light emitting electro-luminescent semi conductor layer sandwiched between two conductive electrodes. Generally, a copper wire serves as a core electrode, and the copper wire is coated with several layers of dielectric and semi-conductor materials which together form a co-axial construction. A transparent conductive layer is added with two thin copper wires which serve as a second electrode. A more detailed description of this electro-luminescent wire is described in U.S. Patent No. 5,869,930 issued February 9, 1999 to Baumberg et al., the technical disclosure of which is herein incorporated by reference.

With reference to Figures 4 and 5, it may be seen, then, that wire 36 is shown to have a conductive core 52 which is surrounded by an electro-luminescent layer 54 which may be an electroluminophor in a flexible binder, for example, one made with a cyanoethyl starch. This structure is embedded in an inner insulation layer 56 in which outer conductors 58 are also embedded. An outer insulation layer 60 is then provided to form a protective shield for electro-luminescent wire 6.

This electro-luminescent wire 36 has the ability to emit light uniformly along its length when an alternating electric current is applied thereto. Moreover, it is flexible, durable, and non-toxic. Importantly, it may be constructed to emit light in a wide range of colors. To this end, the electroluminophor may be doped with copper and/or manganese in various proportions to produce different colors. It should be

understood, however, that other flexible cables, such as fiber optic cables, may be used to obtain the effects desired for the garment of the present invention. Thus, when used herein, reference to a cable that can emit light therefrom means any elongated wire-like structure now existing or hereinafter developed that can either generate light or conduct light in a manner that allows the light to exit through its sidewall in a relatively uniform manner thereby to give the wire-like structure a glowing appearance. On the other hand, "electo-luminescent wire" means a structure that produces light upon the application of an electrical current.

Sleeve 38 in the construction above, is chosen to have a very open weave so as to allow light emanating from electro-luminescent wire 38 to pass therethrough without significant attenuation. It should have a cross-sectional dimension slightly larger than the cross-sectional dimension of electro-luminescent wire 36 for ease of insertion of wire 36 therein during the manufacturing process.

A partially broken away side view of hood 14 is illustrated in Figure 6. In this figure, it may be seen that electro-luminescent wire may be powered by an alternating current power supply 62. To this end, conductive core 52 and outer conductors 58 are in electrical communication by means of wires 64 connected to power supply 62. Power supply 62 is preferably a battery-operated inverter which converts a 3-volt DC battery supply to a suitable frequency alternating current and voltage. Where a light conducting cable is used, the ordinarily skilled person should appreciate that the power supply necessarily includes a light source directing visible light into the cable for transmission thereof. In any event, the power supply is operative in an active state to cause the length of cable to emit light therefrom.

As shown in the Figures, power supply 62 is supported by the garment body. In Figure 6, power supply 62 is depicted as received in a pouch 66 that is preferably

formed of a flexible material having an upper revers 68 that is sewn into seam 32 during construction of hood 14. Pouch 66 has an open slit 70 to allow insertion and removal of power supply 62 so that its batteries may be easily replaced.

In the embodiment of the invention described above with respect to hood 14, it may be appreciated that piping 34 and, thus, electro-luminescent wire 36, serves to frame a garment portion, in this case face panel 18, so that the piping is adjacent to the garment portion. Face panel 18 may be formed of a translucent and reflective material which possesses an iridescent reflectivity. Light emitting from the piping which frames face panel 18 and is adjacent to panel 18 may thereby be reflected from the face panel to give an eerie, glowing appearance to the costume and thus enhance the alien image. The material, however, should readily pass air so that a person may breathe through face panel 18 without impediment.

In addition to framing a garment portion, the piping and electro-luminescent wire of the present invention may be used as a complimentary decorative feature itself. For example, as is shown in Figure 7, piping 134 is shown affixed diagonally on the front portion of a costume 110 which, in this embodiment, is in the form of an heraldic surcoat or tunic. With reference to Figure 8, it may be seen that tunic 110 includes a front panel 112 a rear panel 114 and shoulder panel 116 which includes a neck opening 118 so that tunic 110 may be placed over a wearer's head with panels 112 and 114 draped on the front and back of the body, respectively.

Piping 134 simply forms a decorative diagonal band which, in this case, extends from the neck line diagonally and downwardly to the left edge of tunic 110. Piping 134 is again formed of an open mesh sleeve 138 which carries an electro-luminescent wire 136, as described above. Electro-luminescent wire 136 is again in electrical communication with an AC power supply 162 by means of wires 164 with

AC power supply 162 having a convenient on/off button 163. Power supply 162 is again received in a pouch 166 formed by mesh panels secured by stitching 180 along a top edge and by stitching 182 along a side margin. To this end, then, pouch 166 is affixed on two sides only to front panel 112 of tunic 110. Pouch 166 includes a slit 170 to allow access to power supply 162. Thus, piping 134 and electro-luminescent wire 136 define a decorative feature or accent on the garment body, which here is in the form of the tunic 110.

Figure 10 illustrates a garment 210 in the form of a conical hat 212. Here, piping 234 extends circumferentially around hat 212 and is sewn at a seam with an independent decorative element defined by fabric lace work 235 so as to be associated with the independent decorative element and cooperate with the decorative element to form an integrated design. Piping 234 again carries the electro-luminescent wire 236 and, in this embodiment, it should be understood that piping 234 may extend completely around hat 212 or only partially around circumference of a circular cross-section thereof. In this embodiment, like the embodiment shown in Figure 7, piping 234 forms a decorative feature both alone and in conjunction with lace 235.

In Figure 11, it may be seen that the piping and electro-luminescent wire used in the present invention may form a garment portion in a matter not dissimilar to that with respect to face plate 18 described with respect to the first exemplary embodiment. Here, however, piping 334 carries an electro-luminescent wire 336 and is sewn along the edge of collar 312 of a garment 310 which, in this instance, is in the form of a cloak. Thus, collar 312 has a perimeter that is bounded by piping 334 with electro-luminescent wire being connected to a power supply 362, shown in phantom, and secured in a pouch (not shown) formed as part of collar 312.

Finally, with respect to Figure 12, it may be appreciated that the piping and electro-luminescent wire actually forms the major portion of the garment, itself. In this embodiment the garment body 410 is in the form of insect or fairy wings formed by a stiff-wire frame 412 that is configured into a pair of wings 414 and 416. Piping 434 extends co-extensive with bent-wire frame 412 as part of the garment body to create the wing appearance with piping 434 carrying electro-luminescent wire 436 as described above. A power source 462 is received in a pouch 466 again provided with slit 470 with pouch 466 being suspended from a central portion 418 located at a junction between wings 414 and 416. Shoulder straps 420 are provided to mount garment 410 to a human wearer and adjustable clips 422 are provided for ease in adjusting and releasing shoulder straps 420.

The present invention further contemplates a method of forming a garment utilizing any of the structural features noted above. Particularly, this method provides a garment that has light emitting accents. Broadly the method includes a step of affixing a piping to a portion of the garment as a sleeve having an interior wherein said piping has a sidewall formed by loosely woven strands. The broad method includes the steps of placing a length of flexible cable in the interior of the sleeve wherein the cable is of a type that can emit visible light therefrom and causing the cable to emit light.

In this method, the piping can be affixed to said garment by sewing said piping at a seam between two garment portions. If desired, the piping is affixed to said garment along with an associated independent decorative element adjacent thereto. In this method, too, the cable is an electro-luminescent wire and the step of causing said cable to emit light is accomplished by applying an electric current to

said wire. The piping can be selected to have a mesh size with mesh openings of about 1/16<sup>th</sup> inch by 1/16<sup>th</sup> inch (1.6 mm by 1.6 mm), if desired.

Accordingly, the present invention has been described with some degree of particularity directed to the exemplary embodiments of the present invention. It should be appreciated, though, that the present invention is defined by the following claims construed in light of the prior art so that modifications or changes may be made to the exemplary embodiments of the present invention without departing from the inventive concepts contained herein.